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CH2MHILL

March 19, 2002

Ms. Kristy Chew
Siting Project Manager
California Energy Commission
1516 Ninth Street, MS-15
Sacramento, CA 95814

RE: Data Responses, Set 2C
Cosumnes Power Plant (01-AFC-19)

On behalf of the Sacramento Municipal Utility District, please find attached 12 copies and one original of the Data Responses, Set 2C, in response to Staff's Data Requests dated January 4, 2002.

Please call me if you have any questions.

Sincerely,

CH2M HILL

John L. Carrier

John L. Carrier, J.D.
Principal Project Manager

c: Colin Taylor/SMUD
Kevin Hudson/SMUD
Steve Cohn/SMUD

COSUMNES POWER PLANT
(01-AFC-19)

DATA RESPONSE, SET 2C
(Response to Data Requests: 181, 182 and 183)

Submitted by

SACRAMENTO MUNICIPAL UTILITY DISTRICT (SMUD)

March 19, 2002

CH2MHILL

2485 Natomas Park Drive, Suite 600
Sacramento, California 95833-2937

Technical Area: Hazardous Materials
CEC Author: Alvin Greenberg, Ph.D.
CPP Authors: Karen Parker

BACKGROUND

An Offsite Consequent Analysis (OCA) for aqueous ammonia is necessary for staff to determine if additional mitigation is needed.

DATA REQUEST

181. Please provide the OCA for aqueous ammonia described in AFC Section 8.12.5.

    Response: The Offsite Consequence Analysis for aqueous ammonia is provided as Attachment HM-181.

182. Please provide a schematic diagram and narrative describing the proposed catch basin under the aqueous ammonia storage tank and delivery vehicle transfer pad.

    Response: This response replaces that previously provided in Data Responses, Set 1A. In preparing the OCA analysis, the design of the catch basin/sump was changed from that submitted previously. It is described in Attachment HM-181 and is shown in Figure HM181-1.

Attachment HM-181

Off-Site Consequence Analysis

Introduction

The proposed Cosumnes Power Plant (CPP) is a 1,000 megawatt (MW) net combined-cycle generating facility with four combustion turbine generators (CTGs) equipped with dry, low oxides of nitrogen (NO_x) combustors, four heat recovery steam generators (HRSGs) and two condensing steam turbine generators (STGs).

CPP, under the jurisdiction of the Sacramento Metropolitian Air Quality Management District (SMAQMD), is required[1] to apply Best Available Control Technology (BACT) to control emissions of pollutants that exceed specified thresholds. Selective catalytic reduction (SCR) has been chosen to limit NO_x pollutants exhausted to the atmosphere to 2.5 ppmvd at 15 percent oxygen from the CTG/HRSGs (2.0 ppmvd on an average annual basis).

The SCR equipment will include a reactor chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors. The SCR control system uses ammonia as the reduction medium in the presence of a catalyst. Two forms of ammonia may be used in currently designed SCR systems, i.e., aqueous ammonia or anhydrous ammonia. The CPP facility is proposing to use aqueous ammonia. Section 8.12 of the Application for Certification (AFC) contains a detailed description of the facility location and process data.

CPP will store a 29 percent solution of aqueous ammonia in one stationary storage tank. The tank's capacity will be approximately 18,000 gallons, but will be limited by regulation to storing a maximum amount of 15,000 gallons of aqueous ammonia. The tank will be surrounded by a concrete wall containment berm with a slab that slopes toward a 24-inch diameter drain. The drain will lead into an underground sump sized to contain the entire contents of the tank, plus rain water (see Figure HM181-1).

The aqueous ammonia delivery truck will connect to the stationary storage tank via a 25-foot-long loading hose. The loading hose will have an inside diameter of 2 inches. Similarly, the truck loading area will be located within a bermed area having a sloped pad. The bermed area will drain into the same sump by way of a 10-inch diameter drain that necks down to a properly sized transfer line. Therefore, the total exposed surface area of the containment system, for purposes of the OCA analysis, will be 4 square feet (the approximate area of the 24-inch drain and the 10-inch drain).

[1] Per Rule 2201 (New and Modified Stationary Source Review Rule), which combines implementation of both the federal and California new source review (NSR) program

Probability of Release

Aqueous ammonia is a solution that is maintained at a constant concentration through sealed handling and storage systems. When spilled, the solution will begin to vaporize, slowly releasing ammonia vapors to the surrounding atmosphere. Accidental releases of aqueous ammonia in industrial use situations are rare. Statistics compiled on the normalized accident rates for Risk Management Program (RMP) chemicals for the years 1994-1999 from *Chemical Accident Risks in U.S. Industry-A Preliminary Analysis of Accident Risk Data from U.S. Hazardous Chemical Facilities, J.C. Belke, Sept 2000*, indicates that ammonia (all forms) averages 0.017 accidental releases per process per year, and 0.018 accidental releases per million pounds stored per year. Data derived from *The Center for Chemical Process Safety, 1989*, indicates the accidental release scenarios and probabilities for ammonia in general shown in Table HM181-1.

TABLE HM181-1
General Accidental Release Scenarios and Probabilities for Ammonia

Accident Scenario	Failure Probability
Onsite Truck Release	0.0000022
Loading Line Failure	0.005
Storage Tank Failure	0. 000095
Process Line Failure	0.00053
Evaporator Failure	0.00015

Off-site Consequence Analysis

Pursuant to the federal RMP and CalARP regulations, the offsite consequence analysis (OCA) is to be performed for the release scenario that involves the failure and complete discharge of the main storage tank, as well as an alternative release scenario as determined by facility staff. As such, two scenarios were modeled for this response, as follows:

- Tank failure scenario incorporating the secondary containment area (drain and sump).
- Delivery vessel loading hose failure with the hose contents being spilled to the ground surface.

For purposes of this OCA, two sets of meteorological data were used as follows:

- U.S. Environmental Protection Agency (USEPA) default meteorological data for the worst case release.
- USEPA default meteorological data for the alternative case release.
- The default meteorological data was supplemented, for the worst case scenario, by daily temperature data as required by 19 CCR 2750.2.

Computer Modeling

Table HM181-2 shows the meteorological data values used in the modeling scenarios.

TABLE HM181-2
Meteorological Data Used in Modeling

Parameter	Worst Case Meteorological	Alternate Case Meteorological
Wind Speed (m/sec)	1.0	3.0
Stability Class	F	D
Relative Humidity (%)	50	50
Ambient Temperature (°F)	115	85

A total of two modeling runs were conducted; i.e., single tank failure, and truck loading spill for the corresponding meteorological scenarios listed in Table HM181-1.

OCA modeling was conducted using the ALOHA (Areal Locations of Hazardous Atmospheres) model. A complete description of the ALOHA model is available in the *ALOHA Users Model, U.S. EPA, 1999*. Release rates for ammonia vapor from an evaporating 29 percent solution of aqueous ammonia were calculated assuming mass transfer of ammonia across the liquid surface occurs according to principles of heat transfer by natural convection. An initial evaporation rate was calculated and assumed to occur for at least one hour. For highly-concentrated solutions, the initial rate can often be substantially higher than the rate averaged over time periods of a few minutes or more since the concentration of the solution immediately begins to decrease as evaporation begins.

Emissions of ammonia from the evaporation of an aqueous solution were calculated pursuant to the guidance given in RMP Offsite Consequence Analysis Guidance, USEPA, April 1999.

For the main storage tank scenario, the total amount released would be equal to the maximum amount allowed for storage; i.e., 15,000 gallons of aqueous ammonia. The complete failure of the tank would result in a release of aqueous ammonia, which would release ammonia vapors. The liquid would drain directly into the containment system limiting the area of potential spread of aqueous ammonia and the surface area of evaporation. The total exposed area of the underground sump is approximately 4 square feet. At a solution temperature of 46.1°C the containment system has the potential to emit ammonia vapor at a rate of 3.3 grams per second.

Emissions for the loading spill scenario are based upon a 40-square-foot exposed surface area of aqueous ammonia. A loading spill may result in a greater surface area of exposed solution since the containment system drain will not necessarily be directly beneath the release point as in the case with the tank failure. A conservative estimate of potential exposed area was used for the loading spill, at 10 times the area used for the tank failure. At a solution temperature of 29.4°C the loading spill has the potential to emit ammonia vapor at a rate of 16.2 grams per second.

Although the edge of the tank and loading containment areas are raised above ground level, the release heights used in the modeling were set ground level to maintain the conservative nature of the analysis.

Toxic Effects of Ammonia

With respect to the assessment of potential impacts associated with an accidental release of ammonia, four offsite “bench mark” exposure levels are typically evaluated, as follows: (1) the lowest concentration posing a risk of lethality, 2000 ppm; (2) the Immediately Dangerous to Life and Health (IDLH) level of 300 ppm; (3) the Emergency Response Planning Guideline (ERPG) level of 212 ppm, which is also the RMP level 1 criterion used by the USEPA and California; and (4) the level considered by CEC staff to be without serious adverse effects on the public for a one-time exposure of 75 ppm.

The odor threshold of ammonia is about 5 ppm, and minor irritation of the nose and throat will occur at 30 to 50 ppm. Concentrations greater than 140 ppm will cause detectable effects on lung function even for short-term exposures (0.5 to 2 hours). At higher concentrations of 700 to 1,700 ppm, ammonia gas will cause severe effects; death occurs at concentrations of 2,500 to 7,000 ppm.

The specified toxic endpoint (TE) value for ammonia is 0.14 milligrams per litre (mg/L), which is approximately equal to 212 ppm. The TE value is based on a one-hour exposure or averaging time. Therefore, the modeling concentrations at all offsite receptors will be given in terms of a one-hour (or 60 minute) averaging time.

The nearest sensitive receptor is a residence located approximately 1,775 feet southwest of the tank location.

Modeling Results

Table HM181-3 shows the distances for the two release scenarios to the USEPA/CalARP toxic endpoint of 212 ppm and the CEC significance value of 75 ppm. Figure HM181-2 shows the distance from the ammonia storage tank to the modeled TE (212 ppm) and CEC (75 ppm) significance values for the tank rupture and loading spill scenarios. Figure HM181-2 presents the area of impacts. These data indicates that neither of these concentrations is experienced at any of the identified sensitive receptors. Therefore, the risk of exposure to ammonia from a tank failure or loading spill would not create a significant impact.

TABLE MN181-3
Modeling Results

Scenario	Distance to USEPA/CalARP TE, (212 ppm)	Distance to CEC Significance Value (75 ppm)	Sensitive Receptors Impacted
Tank Rupture	468 ft	801 ft	None
Loading Hose Rupture	186 ft	318 ft	None

(The model input and output files are available upon request.)

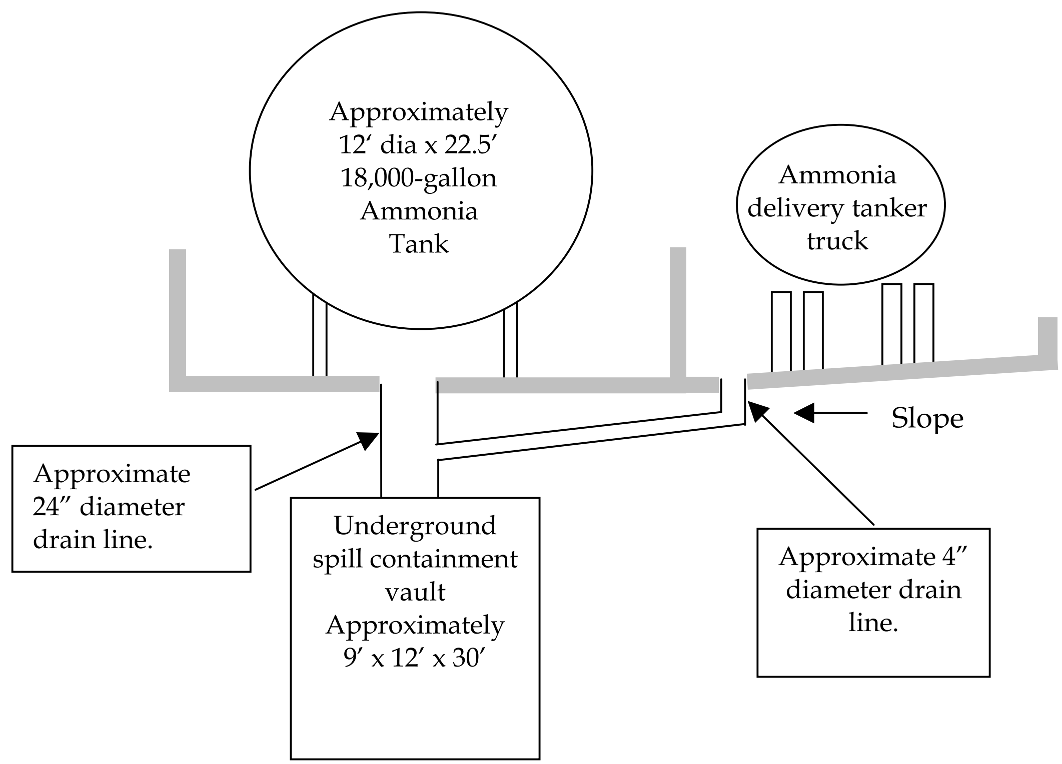

FIGURE HM181-1
AMMONIA SPILL CONTAINMENT
COSUMNES POWER PLANT
APPLICATION FOR CERTIFICATION
PB Power, Inc.

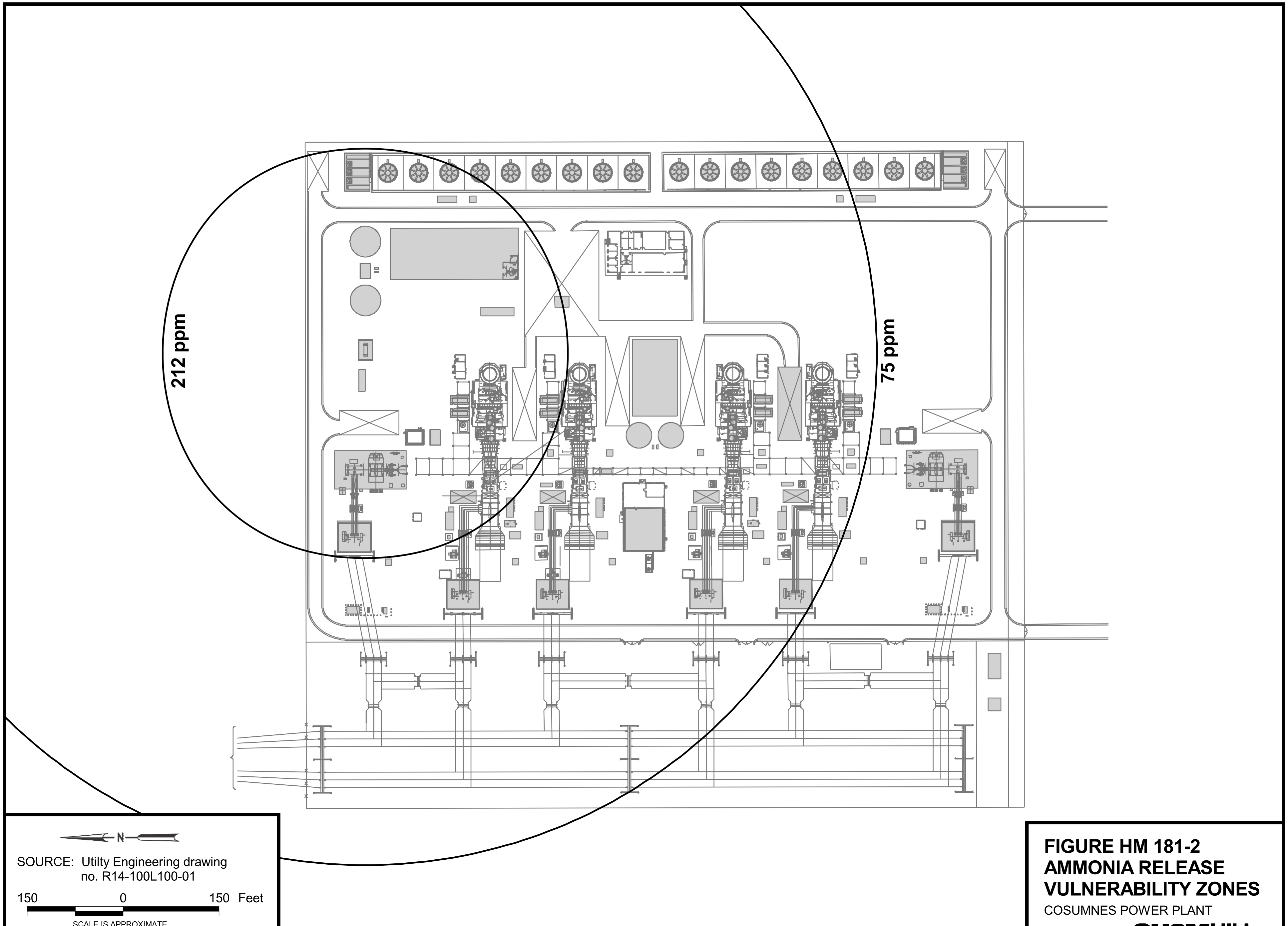

FIGURE HM 181-2
AMMONIA RELEASE
VULNERABILITY ZONES

COSUMNES POWER PLANT

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CH2M Hill RDD ArcView Project File \\Thor\Cart1\rddgis\Rancho_seco\rancho_seco_cad.apr 8:24 a.m. 03-13-2002

Technical Area: Waste Management
CEC Author: Alvin Greenberg, Ph.D.
CPP Authors: Karen Parker

BACKGROUND

The Phase I Environmental Site Assessment (ESA) that was prepared by SMUD is not complete for the 30-acre site or the 26-mile gas pipeline. Additionally, the Phase I ESA that was prepared states that 1993 ASTM guidelines were followed while the most recent standards are July 2000.

DATA REQUEST

183. Please provide a complete Phase I ESA for the 30-acre site, laydown areas, and 26-mile gas pipeline corridor according to ASTM 2000 guidelines.

Response: Based on discussions at the Data Response Workshop held on January 24, 2002, it is SMUD's understanding that the CEC staff is satisfied with information furnished in the AFC for the 26-mile gas line. In fulfillment of our agreement, a Phase I ESA for the CPP site and proposed laydown areas is provided as Attachment WM-183.

Attachment WM-183

Phase I Environmental Site Assessment

Cosumnes Power Plant
and
Associated Infrastructure

Prepared by

B. Demar Hooper, Esq.,
State of California Registered Environmental Assessor, Class I REA-02828
Taylor, Hooper & Wiley, A California Corporation

March 18, 2002

Introduction

This Phase I Environmental Site Assessment (ESA) examines six sites:

- three Transmission Line poles occupying a total of about 0.3 acres of temporarily disturbed land, and less than 0.1 acre of permanently disturbed land;
- a 30-acre site for the Cosumnes Power Plant (CPP), a natural gas-fired power plant;
- a Water Pipeline connecting the existing Rancho Seco Plant (RSP) raw water supply to the CPP site temporarily disturbing a 75± foot wide corridor about 1500 feet long;
- a 20-acre Proposed Laydown site, which will be temporarily cleared and prepared to hold materials to be used in construction of the CPP; and

Collectively, these features are described as the CPP sites. Specific reference to the proposed power plant is indicated by use of the singular "Site."

The CPP Site is located on the north side of Clay East Road, about 50 feet east of the existing transmission lines. The proposed transmission line poles and water pipeline extend north from the CPP Site. The Proposed Laydown is immediately south of the CPP Site, on the south side of Clay East Road. Figure 1 illustrates the proposed layout of the CPP sites including labeling of manmade and environmental features overlaid on an aerial photograph of the project area.

1. **Data Pursuant to ASTM Standard E 1527.**

Attached is the VISTA Information Solutions Report (VISTA Report) for the CPP sites. The singular feature identified near the CPP sites is the Rancho Seco Plant (RSP), (technically, the CPP Sites are all within the boundary of Rancho Seco) which is identified as being listed on the California equivalent Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list. RSP is also a registered generator of hazardous waste.

2. **Data Obtained from Site Visit.**

The CPP sites were inspected on February 27, 2002. Orientation was based on use of an aerial photo, and by reference to recently placed survey stakes marking the corners of the sites and the pipeline and transmission line alignments.

There was evidence of recent grazing use, and of very occasional light traffic, particularly along the right-of-way of the PG&E transmission lines. An empty circular concrete cattle-watering trough was noted near the western edge of the Proposed Laydown site. Based on the pipe connection with automatic shutoff valve, it appeared that the trough was served by some type of underground water supply. There was no evidence at any of the CPP sites of uses other than grazing, including agricultural. Nor was there evidence of any recent plowing or discing that might have been associated with increased productivity for grazing. The site inspection also revealed no concentrations or accumulations of animal waste.

Several features near the CPP sites are worthy of note, and are discussed below based on information from personal interviews. First, Clay Creek flows from east to west just north of the CPP Site, crossing the proposed Water Pipeline corridor. While passing close to the proposed Transmission Line poles and the CPP site, the creek does not touch anything other than the proposed Water Pipeline corridor. Second, north of Clay Creek, the land rises to a gently sloping hill just south of the existing Rancho Seco Plant. Atop the hill is a concrete pad roughly 300 square feet in area. Third, there is a cattle feedlot facility southwest of the CPP sites on the south side of Clay East Road. The feedlot is located on a parcel of land just southwest of the CPP Plant site, across Clay East Road (APN: 140-0050-012) SMUD also shares a north-south property line with the same land parcel. Based on the elevations at the feedlot location, drainage flows north and west toward Clay Creek.

3. **Personal Interviews.**

Interviews were arranged through SMUD to speak with long-term RSP employees who had knowledge of the CPP sites during and even before construction of Rancho Seco. Interviews occurred on February 27, 2001. Interviewees were Jerry Delezenski, Mike Hieronimus, Bill Wilson, and Roy Marciel. Historic familiarity with the CPP sites ranged from 40 years for Mr. Marciel to about 30 years for Messrs. Hieronimus and Wilson, to 18 years for Mr. Delezenski. Information from the interviews is grouped by subject area below.

<u>Grazing</u>

All four interviewees had observed grazing on the CPP sites, although more frequently on the CPP site. Along with the presence of cattle, some of the interviewees remembered infrequent visits by pickup trucks, usually during wintertime, and particularly during dry winters, dropping hay for cattle. They did not recollect any particular stopping place or travel route that might have resulted in any cumulative accumulation of petrochemicals associated with vehicles (gasoline, oil, grease, etc.). According to the interviewees, cattle were rotated on and off the property at a frequency that allowed continued growth of forage, and they observed that there was never a concentration of cattle, which might have led to nitrate accumulations from cattle waste. None of the interviewees recalled ever seeing plowing or discing of the fields, either for cropping or simply for aeration of the rangeland. More specifically, none of the interviewees ever observed the application of fertilizers or pesticides, either from tractors or by hand application. Mr. Marciel recalls that there were occasions when some governmental entity sprayed roadside ditches along Clay East Road. That did not occur, however, until well after the road was paved, which would have been into the 1970s. By that time, the Sacramento-Yolo County Mosquito Abatement District, if it was spraying for mosquito control, was no longer using DDT or other bio-accumulating pesticides. Herbicide spraying may have occurred periodically for one of several reasons –– for example, fire control or assuring proper drainage flow. Based on vigorous vegetation observed along Clay East Road during the site inspection, there is no reason to believe that herbicides have bio-accumulated. For clarification, Clay East Road is not part of any of the CPP sites that are the subject of this investigation. All properties are setback at least 20 feet from the road.

<u>Cattle Feedlot Operation</u>

According to Messrs. Marciel and Wilson, between about 1965 and 1967, a feedlot was constructed at its existing location (14150 Clay East Road). It operated from the late 1960s until the late 1970s. Mr. Wilson recalled that during the approximate period of 1974-75, the feedlot operation resulted in nutrient-laden runoff west of the CPP sites. The elevation gradient would move that runoff away from the CPP sites, and if any reached Clay Creek, runoff would move directly west from the sites. In the intervening 30± years since the feedlot was last in operation, any accumulation of nitrates or nitrites likely dissipated, but in no conceivable circumstance would accumulations migrate to any of the CPP sites.

<u>Stock Watering Water Supply.</u>

Mr. Marciel moved to the vicinity in 1962, and occupied (and still lives in) a farmhouse near the Rancho Seco Plant fronting on Clay East Road. Mr. Marciel confirmed that the concrete watering trough was served by an underground 1.5-inch diameter flexible plastic water pipe that he helped install over 30 years ago. The pipe was buried about 1-1.5 feet deep and ran from the pump at the farmhouse north and east of the CPP sites to cross Clay Creek and Clay East Road. From there it turned to an east-west alignment just south of the existing transmission lines that cross the Proposed Laydown site. The pipe served about four troughs, including the trough on the Proposed Laydown site. The pipe is a flexible plastic (probably PVC), and there is no known aspect of the water supply that raises a risk of contamination of any kind.

<u>The Hilltop Concrete Pad</u>

All four interviewees either knew or had been told that the concrete pad was associated with a small outbuilding that served an adjacent radio transmission tower. Mr. Wilson remembered that the radio station was KRAK. Mr. Marciel also recalled that KRAK transmitted from the tower until shortly before construction of Rancho Seco. By the early 1970s, only the concrete pad remained above ground. Mr. Marciel also recalled, however, that there was a network of small gauge copper wire buried just below the surface surrounding the radio tower, and about 50 acres in area. It is possible that remnants of this wire network may be discovered in trenching for the water pipeline. It seems unlikely that the network would have crossed Clay Creek, which is between the former radio tower and the proposed CPP site.

Miscellaneous Observations

None of the interviewees was aware of any historic or recent uses of any of the CPP sites that could have resulted in chemical, biological, radioactive or any other type of contamination. Mr. Wilson, who is now a contractor to SMUD working with Rancho Seco decommissioning, was until 2001, the Radiation Protection Manager. In that capacity, he recalls that radiological testing occurred in January 2001 to investigate the presence and level of radioactivity throughout the Rancho Seco site. The testing included sampling at the proposed CPP site. Although results have not yet been published, Mr. Wilson recalled that the testing showed nothing higher than background radiation levels.

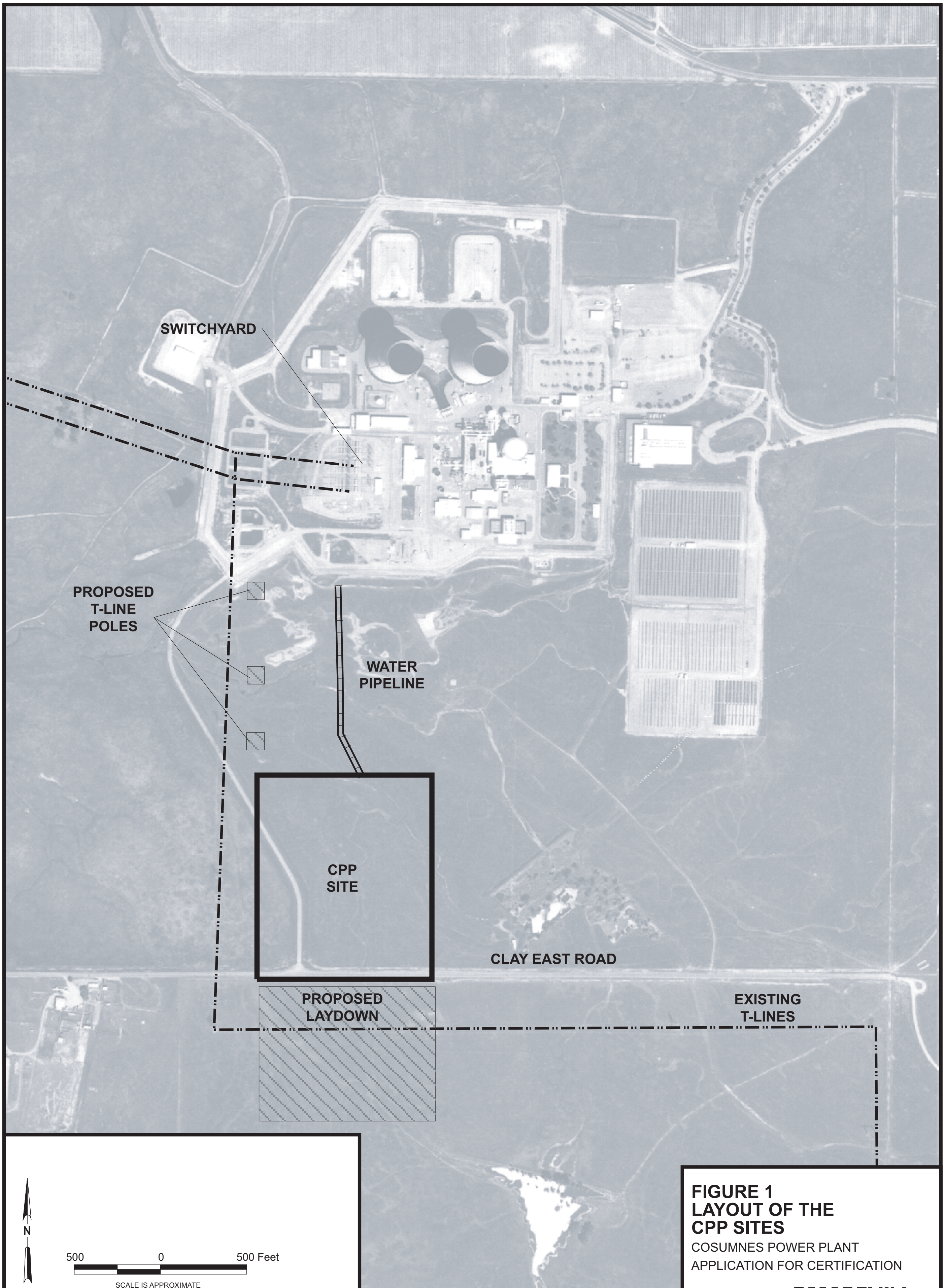

FIGURE 1
LAYOUT OF THE CPP SITES
COSUMNES POWER PLANT
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